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ABSTRACT

The development of a national database describing the real undergraduate curriculum, the courses that college and university students actually take, is reported. Based on analyses of student transcripts from 30 public and private institutions of varying sizes, this report provides a rationale for the database; analyzes student choices across the curriculum and within the humanities, social sciences, and natural sciences, including mathematics; presents a method of describing the curriculum within and across institutions; and offers preliminary statistical conclusions. The basic finding is that there is a notable absence of structure and coherence in college and university curricula, indicating a continued fragmentation of education. Contains eight references. (KM)

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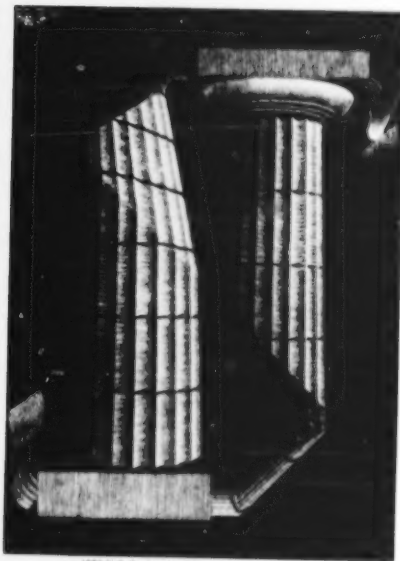
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CURRICULUM
DATA BASE
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ROBERT ZEMSKY

STRUCTURE AND COHERENCE

MEASURING THE
UNDERGRADUATE CURRICULUM



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STRUCTURE AND COHERENCE

MEASURING THE
UNDERGRADUATE CURRICULUM

ROBERT ZEMSKY
Professor and Director
Institute for Research on Higher Education
University of Pennsylvania

ASSOCIATION OF AMERICAN COLLEGES, 1989

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THE PEW MEMORIAL TRUST

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FOREWORD

"All mapmakers," says Bellow's wise old Mr. Sammler, "should put the Mississippi on the same spot on the map. It may be boring but one has to know where he is." In higher education, too, we need agreed-upon reference points—the figurative Mississippis that tell us where we are. At least in the curricular realm, however, we have lacked even the most basic maps on which to try to place them. The challenge of determining on a national scale the dimensions of that terrain known as the undergraduate curriculum—identifying the courses institutions offer and the courses students take—until now has outstripped our technical capacities.

Even the national reports that have directed attention to the need to reform baccalaureate-level education have had to do so, by and large, without data to support their analyses. As a result, they also have provided no baseline against which to measure progress in bringing about the reforms for which they have called.

When, in 1986, the Association of American Colleges conceived of the study reported here, it was with the thought that the time for curricular cartography on a national scale had at last arrived. With the widespread use in higher education of computerized student records systems, we thought it should be possible to determine from a national sample of transcripts what an undergraduate education is for today's

students—not as described in college catalogues but as revealed by the actual course-taking that constitutes that experience. It should be possible to identify the "real" curriculum, to determine not only what courses are offered but also what courses are taken, as well as when, by whom, in what combinations, and with what resulting depth and breadth of exposure.

To carry out this complex task, AAC turned for assistance to the University of Pennsylvania's Institute for Research on Higher Education (IRHE). Directed by Robert Zemsky, the institute—with its staff of programmers, statisticians, and other analysts—was well equipped to meet the intellectual and technical challenges we anticipated. AAC was soon able to present to the Pew Memorial Trust a proposal for the joint development, by AAC and IRHE, of a prototype data base for the analysis of undergraduate course work. Pew generously funded the project for a period of two and one-half years.

AAC is very pleased with what Robert Zemsky and his colleagues have accomplished. Working closely with AAC, IRHE has produced a curriculum data base with potential for at least three broad kinds of uses. The first use is an institutional one. We can now return data to any institution submitting its transcripts for analysis. The data are returned on diskettes that allow the college or university to

do its own further analysis on micro-computers. This institutionally focused product should prove a powerful tool for curricular assessment and academic planning. In subsequent years, as new sets of transcripts are analyzed, it will permit longitudinal study. We also hope to be able to provide institutions ways to exchange data and make comparisons with peer groups of institutions and between and among themselves.

A second broad use will be for special studies of particular student populations or areas of the curriculum. Interested parties might, for example, analyze course-taking by minority students, women, transfer students, or business majors—or indeed minority, female, transfer, business majors. One might examine a broad curricular domain like the humanities or a specific discipline like history. Here again, longitudinal and comparative studies should be possible.

This monograph is itself an example of the third type of application. The first of what we hope will be a long series of reports, it presents some overall findings with respect to the undergraduate curriculum nationally. The set of measures used is small and in time can be expanded and refined. The conclusions are in some respects tentative and certainly are open to debate. But the author, Robert Zemsky, has not shrunk from telling us where, according to his

analysis of AAC's data, our curricular Mississippi flows. In tracing out something of the range and central tendencies of national practice, he gives valuable reference points to individual institutions, groups of institutions, and higher education as a whole. He raises important issues, sharpens our sense of the challenges that face us, and richly fulfills AAC's hopes as to the usefulness of the work undertaken.

If funding can be secured, AAC plans to expand to several hundred the number of colleges and universities participating in the Curriculum Data Base and in time to establish the data base as a self-supporting service. At the appropriate time, AAC will welcome inquiries from institutions interested in taking part by submitting their transcripts for analysis.

We extend special thanks to the Pew Memorial Trust and to Susan Stine, Program Officer of the Pew Charitable Trusts, for funding and other forms of support. Finally, we thank Robert Zemsky and his colleagues at the Institute for Research on Higher Education. In this data base and national curricular map, they have developed an important resource for all of higher education.

John W. Chandler
President, AAC

Joseph S. Johnston, Jr.
Vice President for Programs, AAC

ACKNOWLEDGMENTS

Collaborative enterprises, by their nature, are special ventures. When they work, they yield both a sense of camaraderie and joint responsibility. There is an appropriateness to the use of the first person plural in the text—as in, “we discovered” or “our analysis.”

In this case, “we” consists primarily of my colleagues at the University of Pennsylvania’s Institute for Research on Higher Education. First and foremost is Susan Shaman, who brings to our work an understanding of institutional contexts that is second to none. She shared with me the design of the Curriculum Data Base, led the development team, and focused this monograph on issues that are of central importance. Jody DeMatteo, working with Greg Wegner, was responsible for both the CDB documentation and the drafting of this monograph. Amy Johnson and Diane Gwin developed much of the data used in our analysis and, more importantly, persevered in arguing with me about the appropriate denominator for calculating breadth and depth across a curriculum. Jim Cocroft and Virginia Branch helped design the visual displays, and Rick

Morgan was responsible for much of the original data analysis. Venkat Gangisetty, Dan Shapiro, Mohamed Khalifa, Sandy Rosenberg, and Jim Cocroft executed the complex programming that underlies our analysis of transcripts. It is with considerable filial pride that I thank Peter Zemsky for both designing the Lotus-based software package and providing the initial definitions of structure and coherence.

From the outset, this project has incorporated a special partnership among Susan Shaman, Joseph Johnston of the Association of American Colleges, and myself. Joe brought us the project, joined with us in every aspect of design and interpretation, and helped persuade the Pew Memorial Trust of the critical importance of this research. Susan Stine, from the Pew Charitable Trusts, has provided the kind of thoughtful support of the project that ensures that things are done right. Finally, we are all indebted to the thirty-five institutions that participated in this study. Their willingness to explore tough questions made the project possible. —ROBERT ZEMSKY

THE CURRICULUM DATA BASE

In the fall of 1984, Joseph Johnston came to the University of Pennsylvania's Institute for Research on Higher Education with his colleague, Irving Spitzberg of the Association of American Colleges' Council for Liberal Learning, to ask if we could assist AAC in establishing a data base of the undergraduate curriculum.

They hoped, in particular, to devise a means to describe, and then monitor, the changing circumstances of the liberal arts in American higher education. Irving's earlier experience as general secretary of the American Association of University Professors had taught him the importance of having "clean" comparative data when making the case for improved faculty compensation. He also understood that the ability to compare compensation practices with those of peer institutions could make a difference in a single institution's planning and its willingness to be responsive

to faculty demands. Irving wanted a curriculum data base to provide a similar source of carefully defined, well-monitored data that would facilitate the effective management of participating institutions while also providing a current profile of the status and conditions of the liberal arts.

Joe Johnston's interest was in helping colleges and universities follow through on the recommendations in the Association of American Colleges' *Integrity in the College Curriculum*, one of the first and still the best of a growing number of critiques and analyses of the collegiate learning experience. Joe arrived at our institute with two questions:

- ☐ Could we document the actual condition of the liberal arts curriculum?
- ☐ Could we devise a metric that would allow institutions to measure their success in introducing greater structure and coherence into their in-

The best way to get institutions to change is through the careful application of sound comparative data

structional programs—if those in fact were the attributes they wished to strengthen?

Like his colleague, Joe understood that the best way to get institutions to change their behavior is through the careful application of sound comparative data—data that the institutions help to produce and verify for accuracy and, as a result, are willing to include in their own plans and deliberations.

From the outset, we have followed a dual track in answering Joe's questions. The first was to develop a simple, easy-to-use computer application that allows an individual institution to answer four basic questions:

- ☐ What courses do students actually take en route to the baccalaureate degree? To what extent is the spirit, as well as the letter, of distributional requirements honored? Is there an informal core curriculum of introductory courses that most students take, even though they are not prescribed?
- ☐ Do graduates develop significant concentrations within their majors? Is there sufficient advanced coursework to ensure real depth? Are there sequences of courses that lead students from the introductory level and through an intermediate stage before culminating in one or more senior or capstone courses?
- ☐ How often do students take courses outside their major? Do juniors and seniors sample widely the

offerings in fields other than their own? Is there any coherence among the student's electives—or are they mostly selected because they are easy or taught by a popular professor?

- ☐ Are grades consistent across departments and majors? Are there obvious "gut" courses? Do tougher-than-average grading patterns seem to discourage enrollments in some departments?

The second track was to develop standard measures of breadth, depth, and temporal focus with which we could describe the condition of the liberal arts on a national scale. That analysis was designed to answer these basic questions:

- ☐ Is there consistency in undergraduate curricula across types of institutions? Are there significant differences between public and private institutions? Between selective and nonselective? Between large and small? Between those institutions that offer programs in both the professions and the arts and sciences and those that are devoted exclusively to the liberal arts?
- ☐ Are there significant differences among disciplines? To what extent does the organization of the humanities curriculum differ from the organization of the social sciences or natural sciences curriculum?
- ☐ What is the broad shape of the undergraduate curriculum? What is the relative status of the humanities,

the social sciences, and the natural sciences including mathematics?

The data for both efforts derived from the same source: the transcripts of all students who graduated in the spring of 1986 from thirty institutions (two institutions provided data for their spring 1987 graduates instead). These data were supplemented with course catalogues and rosters, with interviews on the campuses of four of the participating institutions, and with the advice and encouragement of deans, registrars, and faculty on each of the campuses. The first test of the computer methodology involved the engineering curricula at seventeen of the participating institutions, focusing in particular on the kinds of coursework portfolios undergraduate engineering majors assembled in the humanities and social sciences. The results of that first analysis were presented in *Unfinished Design: The Humanities and Social Sciences in Undergraduate Engineering Education*, of which Joe Johnston was principal author.

The Curriculum Data Base software—the computer application mentioned above—is now being tested by thirty-five institutions (data from five of these institutions were not used in this analysis). First indications suggest that it will prove a useful tool, particularly in support of curriculum committees appointed to analyze the state of educational programs at their

own colleges or universities. The software also will facilitate the more general institutional self-study that is integral to the accreditation process. As we expected, part of the attraction of the software is its adaptability to each institution's particular setting and curricular history.

This publication constitutes our attempt to sketch the contours of the liberal arts curriculum across a wide range of colleges and universities. Our initial findings were presented to a plenary session of the Association of American Colleges' 75th Annual Meeting in early January 1989. Since that initial presentation, we have reviewed every aspect of the analysis. In particular, we have developed more robust measures of breadth, depth, and temporal focus that gauge the presence as well as the absence of each attribute across the humanities, social sciences, and natural sciences and mathematics.

Our basic finding, however, remains unchanged. We agree with the authors of *Integrity*. In common sense terms, there is a notable absence of structure and coherence in college and university curricula. Our analyses indicate a continued fragmentation of an educational experience that ought to be greater than the sum of its parts.

We present our analysis in a straightforward way. Chapter Two, "Devising a Metric," presents the ba-

sic measures we developed to gauge the breadth, depth, and temporal focus of the college curriculum. Chapter Three, "Institutional Perspectives," presents a graphic schema that institutions can use to compare the shape of their curricula with the national measures defined in Chapter Two. Chapter Four presents our find-

ings in terms first suggested by *Integrity* and later given particular twists and notoriety by the work of both Allan Bloom and E. D. Hirsch. We have called Chapter Four "First Observations" to stress the tentative nature of conclusions based principally on the analysis of transcripts at just thirty institutions.

DEVISING A METRIC

SAMPLE OF INSTITUTIONS
AND ANALYTIC FRAMEWORK

BREADTH OF STUDY

DEPTH OF STUDY

TEMPORAL FOCUS

The analytic task we set for ourselves was to develop a metric which, while accounting for the inherent complexities of the college curriculum, would provide clear, simple measures of the curriculum's shape and organization—its structure and coherence. We took seriously the principal recommendation of *Integrity in the College Curriculum* that “the curriculum requires structure, a framework sturdier than simply a major and general distribution requirements and more reliable than student interest.”¹ We believed that baccalaureate institutions, collectively as well as individually, wanted to know how they were doing—whether or not the reforms they were instituting to make undergraduate education more coherent as well as more integrated were achieving the desired results.

Having taken seriously colleges' and universities' willingness to assess themselves—to establish measures that over time would monitor the pace and direction of reform—we sought a comparative framework with which an institution could gauge its curriculum against that of its peers while providing the collegiate enterprise as a whole with a better understanding of the liberal arts curriculum across the country. To develop national measures reflecting the broad condition of the liberal arts, we used the final transcripts of all students graduating in the spring of 1986 with a baccalaureate degree in arts and sciences, business, or engineering from thirty separate institutions (for two institutions, we used the transcripts of spring 1987 graduates). We supplemented the transcript

data by drawing substantially on course catalogues and, in the cases of four of the colleges, interviews with department chairs. Finally, we tested our definitions and preliminary conclusions at three workshops attended by representatives of the institutions supplying data to our Curriculum Data Base. It is from these collective experiences and data analyses that we have drawn our portrait of the current condition of the liberal arts curriculum across the country.

SAMPLE OF INSTITUTIONS AND ANALYTIC FRAMEWORK

Our hope is that over the next several years a broad sample of institutions will contribute data to our Curriculum Data Base. Only when the number of institutions grows to two hundred or more will we be able

to describe with confidence the range of curricular patterns that make up liberal arts instruction. In the meantime, we have used our sample of thirty institutions to suggest both the range of current practice and some central tendencies.

The institutions themselves represent a cross section of American higher education. Sixteen states and every region of the country are represented in the sample. We divided the nine public institutions into two groups: five large flagship universities with major research programs and four predominantly undergraduate teaching institutions. We also divided the twenty-one private institutions into four groups: four high-priced, selective research universities; five high-priced, selective liberal arts colleges; six moderately priced colleges and universities; and six lower-priced colleges. These groupings and the codes identifying each group are summarized in Figure 1.

The thirty institutions also vary considerably in terms of their size and the curricular composition of their graduating classes. (See Figure 2.) Three of the five public flagships had more than twenty-five thousand full-time undergraduates. The smallest institution was a lower-priced, Catholic college for women, with just over nine hundred full-time students. In all, eleven private institutions had full-time enrollments of less

FIGURE 1
**CURRICULUM DATA BASE
SAMPLE INSTITUTIONS**

PRIVATE INSTITUTIONS

- A** Four high-priced, selective research universities.
- B** Five high-priced, selective liberal arts colleges.
- C** Six moderately priced colleges and universities.
- D** Six lower-priced colleges.

PUBLIC INSTITUTIONS

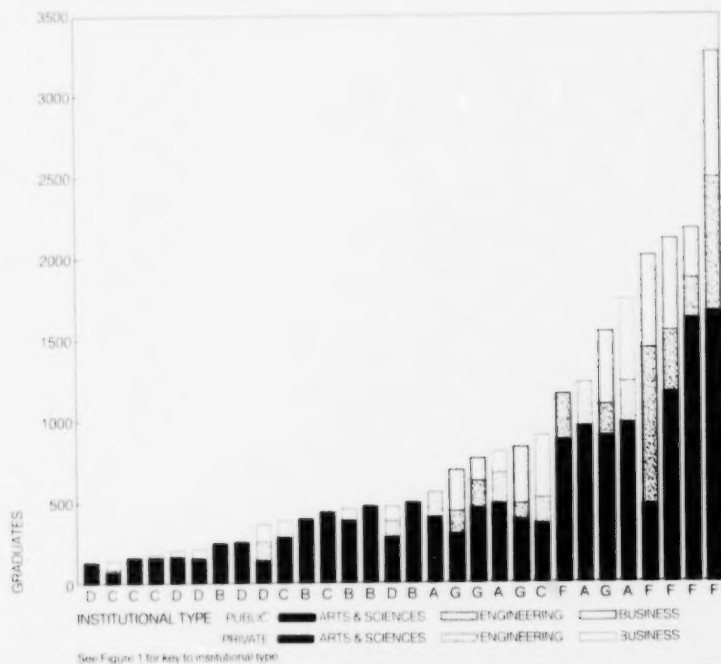
- F** Five large flagship universities with major research programs.
- G** Four predominantly undergraduate teaching institutions.

than two thousand students. Thirteen institutions had no engineering programs, eleven were without business programs, and eight of the private colleges had neither. While all but one of the public institutions offered all three programs—arts and sciences, engineering, and business—only three of the higher-priced, more selective private institutions (A and B) offered business, and none of the five selec-

tive liberal arts colleges offered engineering.

There is also an interesting relationship between the type of institution and the relative size of the spring graduating class. Figure 3 plots each institution's ratio of spring graduates to total full-time equivalent (FTE) undergraduate enrollment. At the far right of the graph are the five high-priced, selective liberal arts col-

FIGURE 2
SIZE OF SPRING GRADUATING CLASS



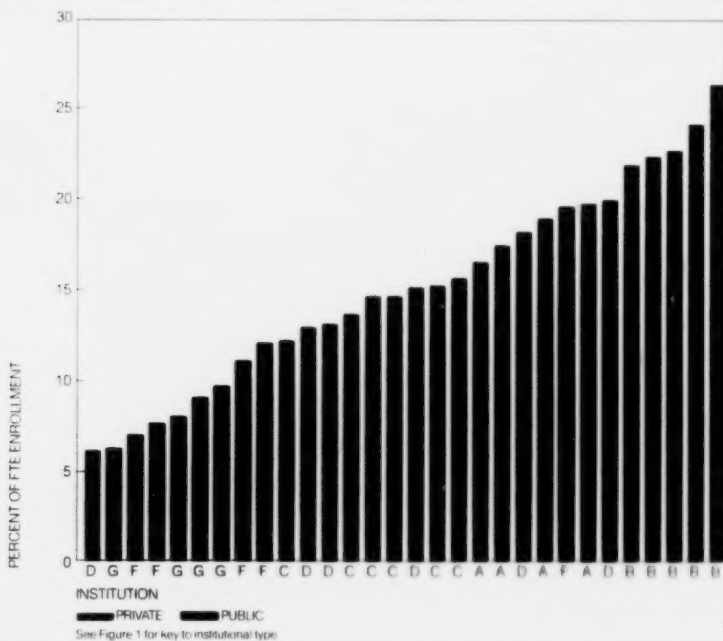
The analysis of institutional practices and customs begins with the recognition that there are two ways to define the curriculum

leges (B) in which the graduating class constitutes at least 22 percent of the FTE enrollment. This is the traditional college pattern, where the number of seniors roughly equals the number of freshmen who themselves will graduate in four years. Coming down the slope, right to left, is a group of seven institutions, consisting of the four high-priced, private research universities (A); two lower-priced private colleges (D); and the

public flagship university in our sample that most resembles a highly selective private university (F). At the far left of the graph are the remainder of the public institutions (E, G).

Fundamentally, the slope represents the declining number of graduates who fulfill the traditional cadence of a student career—matriculating one fall semester and graduating four years later in the spring. Among the institutions at the left of the graph,

FIGURE 3
SPRING GRADUATES



there are more transfer, intermittent, and part-time students, as well as lower retention and graduation rates. Traditional definitions of the collegiate curriculum that presume "normal progress toward a degree" in either four or five years may ultimately prove inappropriate for most public and many private institutions, and particularly for those with lower-priced programs designed for part-time and other nontraditional students. It is a caution worth remembering as one considers the actual shape of the liberal arts curriculum among these institutions.

The analysis of institutional practices and customs begins with the recognition that there are two ways to define the curriculum. On the one hand, there is a supply of courses (or other formal, for-credit learning options), largely defined by departments or, on some smaller campuses, by divisions. Some courses have well-defined links to other courses, serving as prerequisites or as advanced courses. Some courses are a well-defined unit, as in a core curriculum or a fully defined department major. Many courses, however, are largely self-contained; they neither constitute nor entail a prerequisite.

On the other hand, the curriculum can be defined as the sum of each graduate's coursework. Each student en route to a baccalaureate degree assembles a profile of courses—an edu-

cational portfolio. Some of these courses satisfy distribution or core requirements; some satisfy the requirements of the major and minor; some satisfy the student's own curiosity or self-defined need to acquire particular skills or knowledge; and some serve to pad the total number of courses needed for graduation.

Our analysis takes place at the intersection of the courses offered and those taken—our two definitions of the curriculum. We wanted to know what the supply of courses was in our sample and what their link was to one another. We also wanted to know what the actual courses were that the graduates took and to what extent their choices fulfilled their institutions' expectations of the proper breadth and depth for a college education.

To a considerable extent, the two definitions of curriculum are linked; in some institutional settings, the pattern of course offerings can parallel the pattern of courses elected by students. If the institution offers a single set of courses required of all students, then the two definitions of the curriculum are identical. It is also possible for the faculty to prescribe a limited number of paths leading to a degree. Students may be free to choose which path to take, but in electing one they immediately begin narrowing their options. Even when the faculty adopt a *laissez-faire*

attitude toward the curriculum, it is possible for the marketplace to impose a kind of rough order. A number of institutions find that most freshmen, for example, take either what they think will eventually be needed to get into professional school or a basic set of popular courses, such as introductory economics and/or psychology, a freshman English course, calculus, and an elective, often in either history or sociology. Although these courses are not required for graduation or for most majors, the students have established their own common, if not core, curriculum.

What the faculty proffer and what their students avail themselves of can differ in another important way as well. We found that many courses listed on students' transcripts were actually taken by very few students—too few, in fact, to hold their weight in our analysis of the curricula. We decided, therefore, that the analysis of a particular course could proceed only if a reasonable number of graduating seniors had that course on their transcripts. In our lexicon, courses that met a prescribed minimum enrollment were labeled as "tagged." In most cases, that reasonable enrollment minimum was ten for large schools (schools with large numbers of regular students) and five for smaller institutions. The total percentage of student activity (measured in

course or credit units) in tagged courses always constituted at least 90 percent of all the credit units taken by the graduating class in arts and sciences, business, and engineering.

This procedure, originally used to make certain that our analysis was not skewed by courses that were not part of the continuing curriculum or whose enrollments were so small as to allow for customized instruction, turned out to provide an interesting measure of the dispersion of faculty activity by domain: humanities, social sciences, and mathematics and natural sciences. In some institutions and some domains, there was a direct relationship between the percentage of tagged courses and the percentage of student activity in tagged courses. What the faculty regularly taught was what, by and large, the students took. In other settings, however, there was a remarkable disjunction between faculty and student activity. In these settings it was not uncommon, for example, for students to concentrate more than 80 percent of their course or credit units in less than 30 percent of the total number of courses offered in the domain.

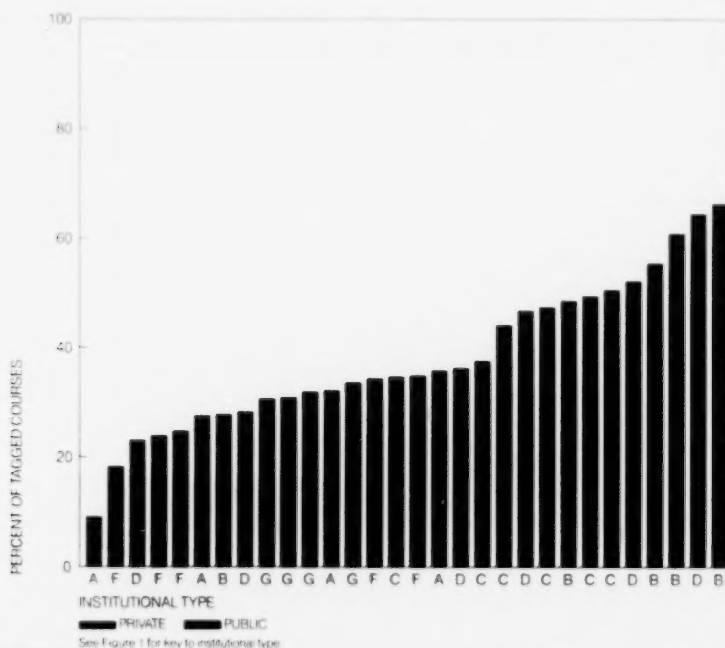
Several explanations can be offered for this circumstance. Any course for which at least one graduating senior received undergraduate credit was included in the total number of courses—that is, it was included in the denominator of the ratio of tagged

courses to all courses. Clearly, some of those were graduate-level courses to which the undergraduate was admitted and, hence, not really part of the undergraduate curriculum. Others were undergraduate courses in undergraduate schools not included in our study—for example, schools of education and nursing in the larger public institutions. Similarly, special, non-degree courses in which an undergraduate received permission to

enroll would be included in the denominator. To some extent, then, a low ratio of tagged courses to all courses reflects the presence of substantial course options outside the three principal undergraduate curricula: arts and sciences, engineering, and business.

It is also clear, however, that the ratio of tagged courses to all courses can indicate to what degree a curriculum consists of highly customized

FIGURE 4
TAGGED COURSES



Commitment to breadth of study remains the fundamental characteristic of a liberal education

faculty offerings taken by a few students but avoided by most in favor of more popular—possibly safer—mainstream courses. On the average, slightly less than 40 percent of the courses taken by graduating seniors over the four years were tagged. That average, however, conceals a good deal of variance across domains and within institutional types. It was frequently the case in our analysis that natural science and mathematics courses were more likely to be tagged than social science courses, and they in turn were more likely to be tagged than humanities courses. The more significant variance, however, was across institutional types. (See Figure 4.) Almost uniformly, the institutions with substantial ratios of tagged courses to all courses were the smaller, teaching-oriented liberal arts colleges (types B, C, and D). No research university (types A and F) had more than 40 percent of its courses tagged. On the other hand, one of the most selective liberal arts colleges also had one of the lowest ratio of tagged courses to all courses.

This pattern suggests that the curriculum of a small teaching college tends to contain less surplus than that of a larger, research-oriented university that provides students as well as faculty with substantial opportunities to “do their own thing.” The pattern also provides a useful standard for making similar compar-

isons of what we refer to as the breadth, depth, and temporal focus of liberal arts curricula across different institutions.

BREADTH OF STUDY

Commitment to breadth of study remains the fundamental characteristic of a liberal education. While specialization and job-related training have become integral parts of the collegiate curriculum, we expect this narrowing to follow—indeed to be built upon—a broad introduction to the humanities, social sciences, and natural sciences including mathematics. Hence the importance of the general-education component of the baccalaureate degree and the distributional requirements students are expected to meet en route to their degrees.

To compare the experiences of graduates of the thirty institutions in our sample, we developed a three-tiered definition of experience in each domain—humanities, social sciences, and natural sciences including mathematics—as follows:

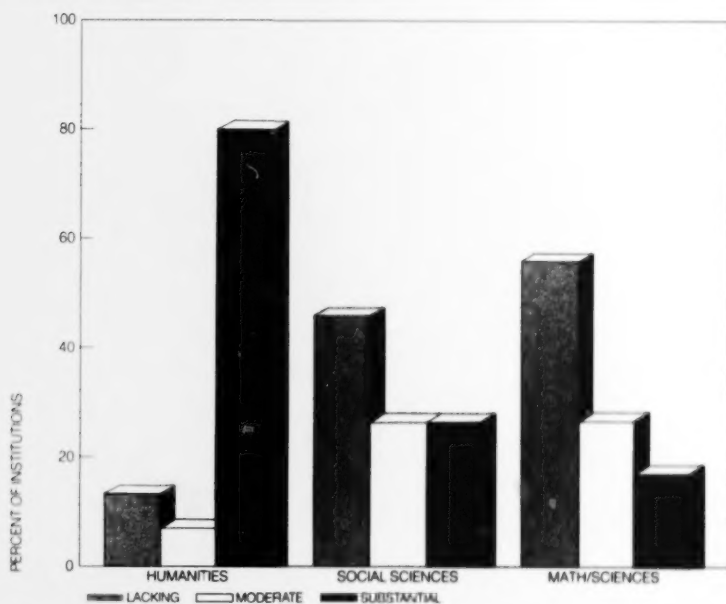
- ☐ *Substantial experience*: 80 percent or more of all graduates took four or more courses in the domain.
- ☐ *Moderate experience*: less than substantial experience, though at least 87.5 percent of the graduates took three courses in the domain.
- ☐ *Lacking experience*: more than 12.5

percent (one-eighth) of all graduates took less than three courses in the domain.

We then asked, for each domain, at how many institutions did graduates achieve either substantial or moderate experience? The answer was hardly surprising. (See Figure 5.) In the humanities, only four institutions graduated students who lacked at least a moderate introduction to the domain; at twenty-four of the institutions in the sample, 80 percent

or more of the graduates took four or more courses in the humanities. In the social sciences curricula, students at just under half the institutions lacked experience in the domain. Students at one-quarter of the institutions achieved moderate experience and another quarter substantial experience. For the natural sciences and mathematics the results form an important warning. At just five institutions did at least 80 percent of the graduates take at least four courses in

FIGURE 5
EXPERIENCE BY DOMAIN



the domain. There was a genuine absence of broad exposure to the domain at seventeen institutions.

To define an overall measure of breadth of study we constructed a simple *Breadth Index* (BI), giving an institution one point for each domain in which its graduates achieved substantial experience and taking away one point for each domain in which its graduates lacked experience. Thus, an institution whose

graduates acquired substantial experience in all three domains would receive a score of 3; an institution whose graduates lacked experience in all three domains would receive a score of -3. Institutions received a score of 0 if their graduates achieved moderate experience in all three domains, or if they compensated for lack of experience in one domain with substantial experience in another.

FIGURE 6
OVERALL BREADTH OF STUDY

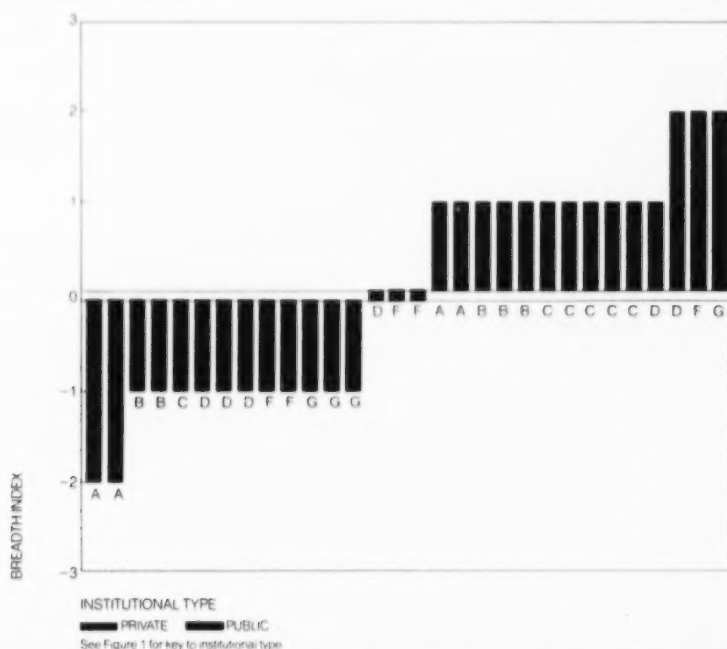


Figure 6 plots the Breadth Index for our sample of thirty institutions. Along the horizontal (X) axis, we have arrayed the corresponding institutional type for each BI. The result makes clear that breadth of study is not associated with institutional type. Research universities were as likely to encourage—and not encourage—breadth of study as liberal arts colleges of every stripe from the least to most selective. Breadth of study, then, appears to be primarily associated with institutional setting and values rather than with cost, prestige, or academic organization.

DEPTH OF STUDY

Developing the definition and metric for breadth of study proved relatively simple. We wanted to know whether the graduates of most institutions had broad experience with a range of courses in each domain of the liberal arts: humanities, social sciences, and natural sciences including mathematics. We found that breadth of study varied greatly across institutional type, except that generally experience in the domain of natural sciences and mathematics was lacking.

Defining depth of study, the second goal of liberal education, proved more elusive. The commonsense definition of depth is both specialized and advanced coursework within a single field or discipline. Often, a set

of well-defined major requirements is taken as an implicit measure of depth of study—the college curriculum's version of "time on task."

We sought something more by asking a closely related question. Does the institution offer advanced coursework—coursework that one cannot take as a beginner—in most fields in the liberal arts? Is there a sequence of courses—that is, a path through the curriculum—that requires a student to use the knowledge and techniques gained in introductory courses in intermediate and advanced courses? We considered an advanced course to be something like a link toward the end of a chain of courses, each course serving as a prerequisite for the next course or link in the chain.

In developing a specific measure of depth of study, we proceeded much as we had in developing a metric for analyzing breadth of study. The first task was to define depth of study in a way that allowed us to compare the educational portfolios of the graduates across the thirty institutions and among the three domains. We decided that the curriculum of a domain could be characterized as having substantial depth if roughly one-third of the tagged courses in the domain had three or more prerequisites—as evidenced by what the graduates actually took rather than what the course catalogue professes. We

said that a curriculum lacked depth of study in the liberal arts when less than one out of every six courses had three or more prerequisites. More formally, we developed a three-tiered definition of depth of study for each domain—humanities, social sciences, and natural sciences including mathematics—as follows:

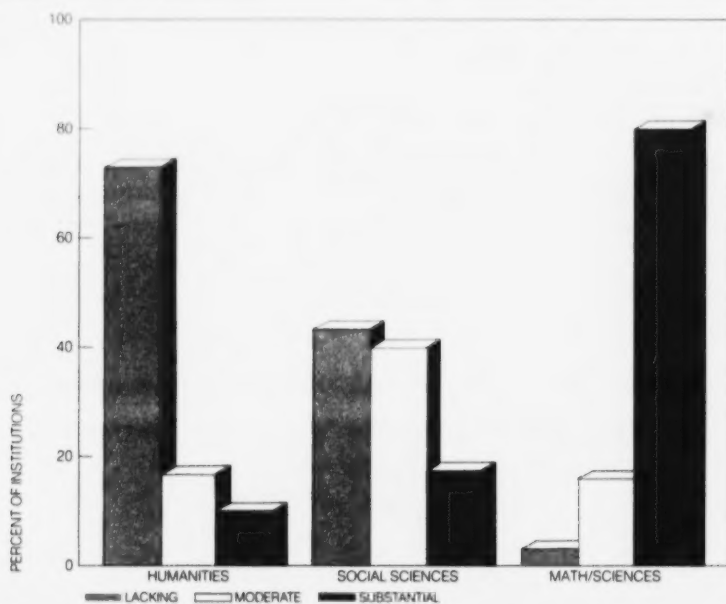
- *Substantial depth*: 33.3 percent or more of all tagged courses in the domain had three or more prerequisites.
- *Moderate depth*: more than 16.7

percent, but less than 33.3 percent, of all tagged courses in the domain had three or more prerequisites.

- *Lacking depth*: 16.7 percent or less of all tagged courses in the domain had three or more prerequisites.

Again, the relative depth of study among the three domains adhered to expected patterns. (See Figure 7.) At most institutions (80 percent), more than 33.3 percent of the courses in the natural sciences and mathematics had three or more prerequisites. At

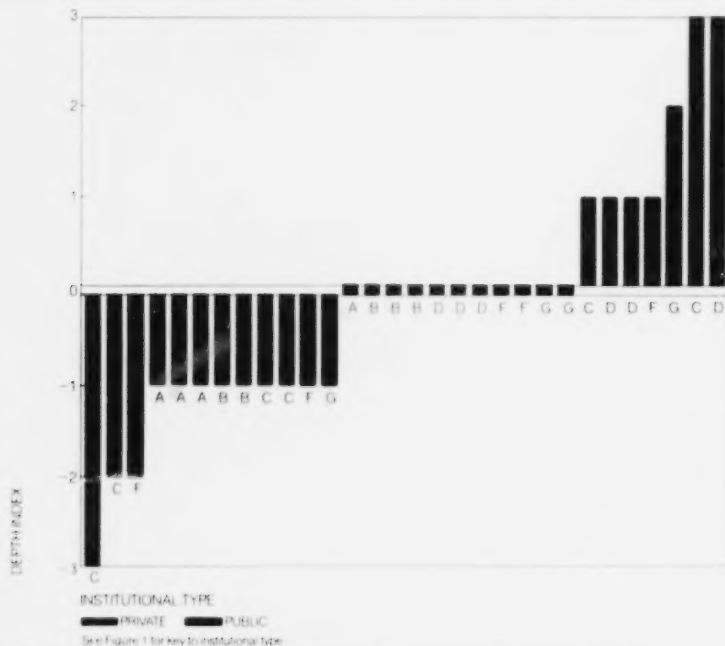
FIGURE 7
DEPTH OF STUDY BY DOMAIN



only one institution did less than 16.7 percent of the natural sciences and mathematics courses have three or more prerequisites. The social sciences showed less depth: 40 percent of the institutions had at least moderate depth in the domain and more than 40 percent lacked depth of study across the social sciences curricula. The humanities curriculum largely lacked the kind of depth of study conveyed through prerequisites.

Following the same strategy we used to measure breadth of study across domains and institutions, we constructed a simple *Depth Index* (DI) by giving each institution one point for each liberal arts domain in which its curriculum exhibited substantial depth and taking away one point for each liberal arts domain in which its curriculum lacked depth. Thus, an institution with substantial depth of study in all three domains would re-

FIGURE 6
OVERALL DEPTH OF STUDY



ceive a score of 3; an institution lacking depth across all three domains would receive a score of -3. A score of 0 means that the institution had moderate depth across all three domains, or compensated for lack of depth in one domain with substantial depth of study in another domain.

The institutional scores for depth of study were distributed across the band, ranging from -3 to +3. (See Figure 8.) Again, institutional type, size, and complexity are shown to have no necessary relation to depth of study. We also know that depth of study is not associated with tuition, percentage of class in arts and sciences majors, or, interestingly enough, breadth. Indeed, the two indices seem to reflect almost orthogonal dimensions of the curriculum, with depth of study predominantly measuring the wide availability of alternate pathways through the curriculum and greater reliance on the marketplace to inform student choice,

but rather on the idea that students should spend a significant amount of their time studying and learning with students of roughly similar levels of experience. Here we have asked to what extent coursework is organized in terms of beginning courses students would normally take in their first year of college, intermediate courses students would normally take in either their second or third year of college, and senior or capstone courses students would normally take in their final year. We defined temporally focused courses as those in which 75 percent or more of the students in the class were in the same stage of their collegiate careers.

"Mixed" courses were those in which more than 25 percent of the students in the class were in different stages of their collegiate careers than the majority of their classmates. Mixed courses, in fact, most often drew their students from each career stage: freshman or beginning; sophomore-junior or intermediate; and senior.

In a temporally focused curriculum, we would expect that as many as one-third of the tagged courses would be designed specifically for students who are either beginning or ending their undergraduate program.² As with breadth and depth of study, for each liberal arts domain we defined three levels of temporal focus.

□ *Substantially focused*: at least 25 percent of the tagged courses were

TEMPORAL FOCUS

A third component of curricular structure derives from what we have called the "temporal focus" of the curriculum. Temporal focus is the natural complement to depth of study, measuring the extent to which there is a sequence of learning that builds not on specific requirements,

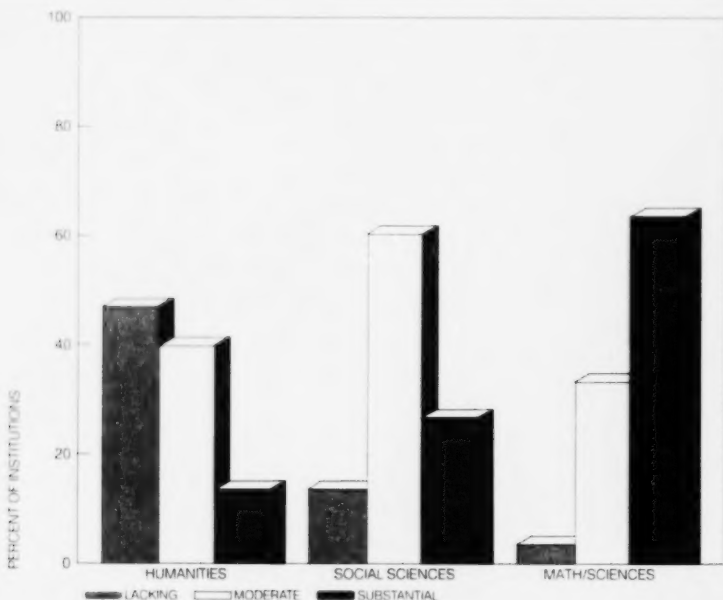
predominantly for freshmen or for seniors—that is, they drew more than three-quarters of their enrollments from students either in their first or last year of college.

- *Moderately focused:* less than 33.3 percent of the tagged courses were mixed courses, but less than 25 percent were freshman or senior courses.
- *Lacking focus:* more than 33.3 percent of the tagged courses were mixed.

Among the liberal arts domains, the distribution of temporal focus

also follows the expected pattern. (See Figure 9.) More than 60 percent of the institutions provided substantially focused natural sciences and mathematics curricula. At only one institution was the natural sciences and mathematics curriculum lacking temporal focus. Conversely, the humanities curricula lacked focus at almost half the institutions; only four institutions evidenced substantial focus in the humanities. As in each of the preceding dimensions, the social

FIGURE 9
TEMPORAL FOCUS BY DOMAIN



Temporal focus presents a pattern in which the structure of the curriculum is fundamentally a product of institutional culture

sciences were in the middle: more focused than the humanities, less focused than the natural sciences and mathematics.

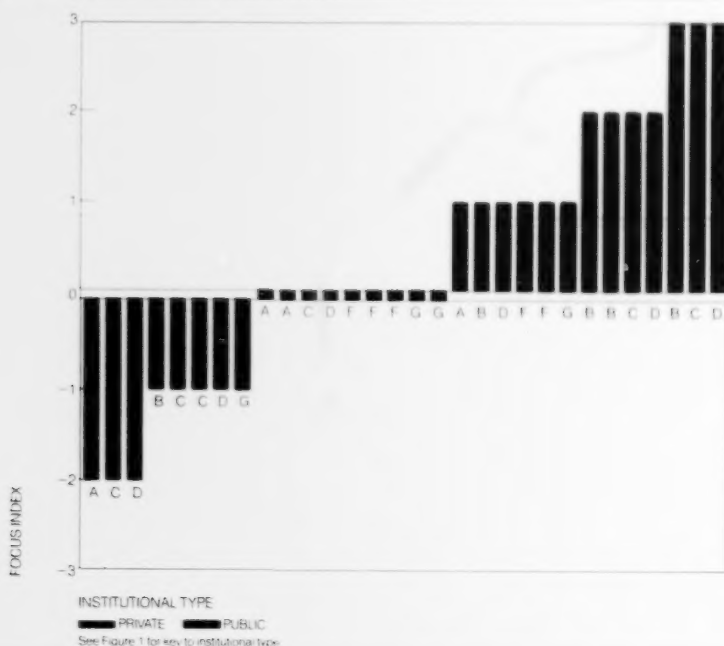
To compare temporal focus across domains and institutions, we used the same simple scoring system. For each substantially focused domain, the institution received one point; for each domain lacking temporal focus, the institution lost one point. Summing across domains, the result-

ing *Focus Index* (FI) ranged from -2 to $+3$. (See Figure 10.)

Temporal focus of curriculum was not significantly correlated with size of student body, number of graduates, tuition, percentage of curriculum devoted to the liberal arts, breadth or depth of study.

Our basic conclusion is that temporal focus, like the earlier indices, presents a pattern in which the structure of the curriculum is fundamentally a

FIGURE 10
OVERALL TEMPORAL FOCUS



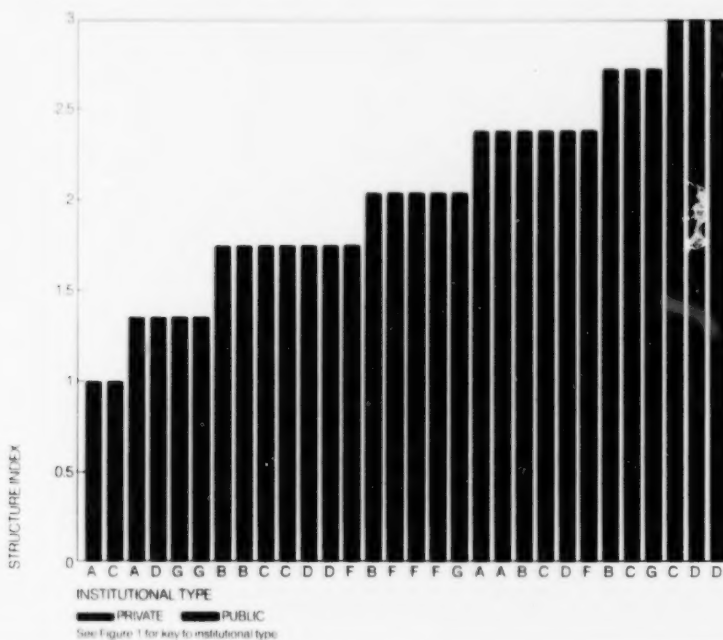
product of institutional culture.

That same conclusion is echoed in the distribution of a fourth index, the *Structure Index* (SI), which reflects our overall measure of the structure of the curriculum. SI is constructed by scoring each dimension—BI, DI, FI—separately as follows:

- Substantial = 3
- Moderate = 2
- Lacking = 1

and then dividing the resulting sum by 3. Thus a curriculum that had substantial breadth, depth, and temporal focus would receive a score of +3; a curriculum lacking breadth, depth, and temporal focus would receive a score of 1. The results of these calculations are displayed in Figure 11 and represent the basis for depicting the shape of an individual institution's curriculum presented in the next chapter.

FIGURE 11
DEGREE OF CURRICULAR STRUCTURE



INSTITUTIONAL PERSPECTIVES

One advantage of constructing a national metric is that it enables individual institutions to understand better the shape and coherence of their own liberal arts curricula. To a considerable extent, of course, there are intrinsic standards in the concepts of breadth, depth, and temporal focus of undergraduate study. Their presence assures first that baccalaureate students are encouraged, if not required, to gain broad experience among each of the three major domains—humanities, social sciences, and natural sciences including mathematics—and second that these students are provided course sequences designed to advance them from beginners to mature learners ready for the most complex and difficult coursework their majors offer. It is also the nature of institutional prac-

tice, however, to search for a comparative. "How are we doing relative to our peers?" is the question that begins almost every campus consideration of educational reform.

Because our measures of breadth, depth, and temporal focus proved largely independent of one another, we were able to develop a rather simple and straightforward graphic representation of the "shape" of individual curricula—both for the liberal arts as a whole and for each of the three principal domains separately. We began by imagining a college or university curriculum as represented by a box in which the measures of breadth, depth, and temporal focus correspond respectively to the box's linear dimensions of width, depth, and height. We linked the size and relative shape of the box with the

'How are we doing relative to our peers?' is the question that begins almost every consideration of educational reform

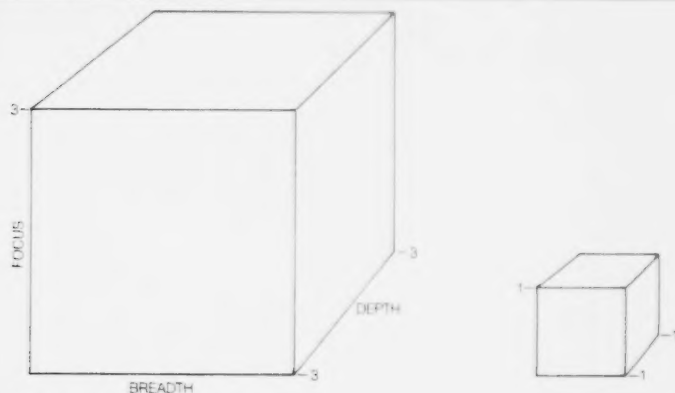
components of the Structure Index, which was itself a composite of the individual indices characterizing breadth, depth, and temporal focus. Recall that in constructing the SI, each institution's separate indices—BI, DI, FI—were converted to a simple three-point scale. When the index was positive, the score was 3; when the index was zero, the score was 2; when the index was negative, the score was 1.

Thus a college curriculum that had positive scores along each of our three dimensions—that is, achieved measurable breadth, depth, and temporal focus in all three domains—

would be represented by the large box on the left in Figure 12. A curriculum that lacked significant breadth, depth, and temporal focus in all three domains would be represented by the small box on the right in Figure 12.

Similar graphic representations can be made of the shape of the curriculum within each domain. A natural sciences and mathematics curriculum, for example, in which on the average students lacked broad experience, but which encouraged substantial depth of study and substantial temporal focus, would be represented by the box on the left in Figure 13.

FIGURE 12
**REPRESENTING CURRICULAR STRUCTURE
IN THREE DIMENSIONS**



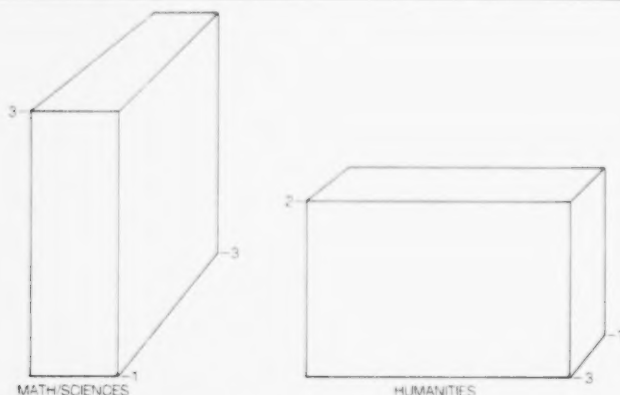
The maximum is 3.0 each for breadth, depth, and temporal focus

On the other hand, a humanities curriculum, for example, that encouraged substantial experience in the domain for almost all students but lacked both depth and temporal focus would be represented by the box on the right in Figure 13.

Figures 14 through 16 present graphic representations of the actual patterns for three of the institutions in our initial sample. The numbers in each of these figures represent the degree of structure in all three dimensions—breadth, depth, and temporal focus. Figure 14 presents data from College X, a highly selective liberal arts college with a strong reputation

for science instruction. Having a smaller endowment than many of the institutions with which it competes for students, College X also has a strong reputation for administrative efficiency that carries over into its curriculum. There is remarkably little surplus in the curriculum. More than 90 percent of the courses listed on the student transcripts appeared often enough to be tagged by our analysis. Faculty course loads at College X are slightly heavier than average for this type of college. It is one of the few institutions to preserve successful completion of a comprehensive examination as a requirement for

FIGURE 13
**REPRESENTING CURRICULAR STRUCTURE
IN THREE DIMENSIONS**



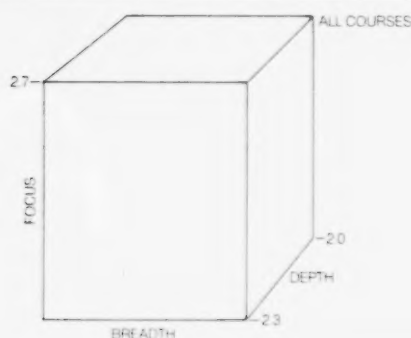
The maximum is 3.0 each for breadth, depth, and temporal focus.

graduation. Approximately half its graduates major in the humanities, with one-quarter each in the social sciences and in the natural sciences and mathematics.

College X achieves substantial breadth across its curriculum, though significantly more students take four

or more courses in the humanities than in either the social sciences or in the natural sciences and mathematics. Again, in the natural sciences and mathematics there is substantial depth, moderate depth in the social sciences, and almost no depth in the humanities. Across all domains there

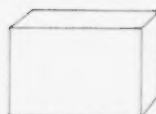
FIGURE 14
CURRICULAR STRUCTURE
COLLEGE X



MATH/SCIENCES



SOCIAL SCIENCES



HUMANITIES

The maximum is 3.0 each for breadth, depth, and temporal focus.

is measurable temporal focus—an attribute that almost all the smaller institutions have in common.

University Y, whose curriculum is portrayed in Figure 15, is a major public research university with a large investment in undergraduate education. A significant number of its matriculants are transfers and part-time students, many of whom attend college intermittently. University Y has a national reputation for the quality of its engineering and science programs, with enrollments in these domains accounting for nearly 40 percent of all the coursework compiled by its spring 1986 graduates whose transcripts are in our study. The concentration of student activity within a relatively narrow band—more than 90 percent of student enrollments concentrated in just over one-third of the available courses—typifies the pattern found at most large research institutions. In broad sketch, this institution's curriculum provides substantial depth of study in the social sciences and in the natural sciences and mathematics; it generally lacks breadth because too few students take courses outside the humanities or their professional major; and it presents a humanities curriculum that generally lacks both depth and temporal focus.

University Z (Figure 16), on the other hand, presents a curriculum that is largely unstructured in each

FIGURE 15
CURRICULAR STRUCTURE
UNIVERSITY Y

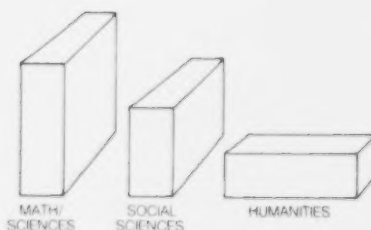
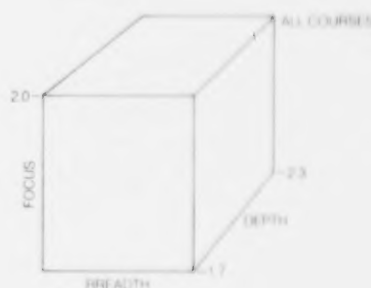
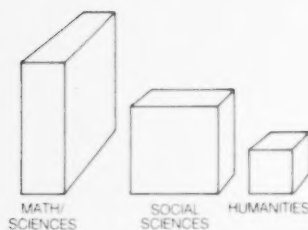
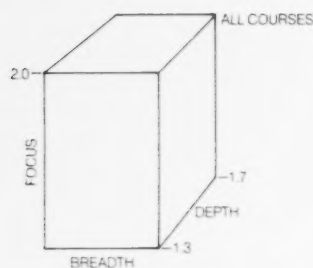


FIGURE 16
CURRICULAR STRUCTURE
UNIVERSITY Z



The maximum is 3.0 each for breadth, depth, and temporal focus.

dimension and all three domains. Only in the natural sciences and mathematics is there substantial depth of study. The humanities lack all the attributes of structure, although the university is known for the quality of its graduate programs in the humanities. A private research institution, University Z has strong programs in business and engineering and a variety of graduate-professional programs that offer instruction to undergraduates. As with the public research university, student coursework remains concentrated within a narrow band of courses available to undergraduates—88 percent of all coursework is accounted for by just 27 percent of all courses.

FIRST OBSERVATIONS

We have just begun to probe the analytic richness of the Curriculum Data Base. Our goal was to describe the current condition of the undergraduate curriculum, establishing benchmarks against which to measure future reforms in terms of their ability to achieve proclaimed ends. It would be presumptuous to claim to have described the contours of the undergraduate curriculum across the country. We do feel confident, however, in offering a set of first observations.

1. The undergraduate curriculum is in substantial need of greater structure and coherence.

Colleges and universities have been told—and told quite forcibly—what is wrong with the American baccalaureate curriculum. A plethora of reports, jeremiads, and assessments has given distinctive voice to widely shared feelings that the nation's colleges and universities have gone astray. *A Nation at Risk* decried the "rising tide of mediocrity," which it found to be eroding the "educational foundations of our society."¹ The an-

tidote it prescribed was a renewed commitment on the part of both schools and colleges to measurable standards and academic rigor. William Bennett argued in *To Reclaim a Legacy* both for a core curriculum and for placing the humanities at the center of that instruction. Ernest Boyer's *College* sketched a dismal landscape of colleges that had become purposeless, of faculty members who too often felt trapped and out of place, of students and families who saw less and less value in an increasingly expensive product.

By the late 1980s, however, discussions about the nature and purpose of the collegiate experience became centered around three quite separate analyses, each drawing upon the growing feeling that fundamental reforms were needed, and yet each seeking to shape distinctly the direction those reforms would take. The first was the Association of American Colleges' *Integrity in the College Curriculum*. This report to the academic community was quickly followed by two books that, to the amazement of all, have become national best-

Colleges and universities, like primary and secondary schools, have all but abandoned any sense of structure

sellers: Allan Bloom's *The Closing of the American Mind* and E. D. Hirsch's *Cultural Literacy*.

In part because his visceral defense of cultural elitism proclaims what others have only whispered, Bloom's critique has proved to be the more notorious as well as lucrative. Often lost amid the charge and counter-charge evoked by Bloom's insensitivities is the accuracy of his sketch of what the modern student finds upon arriving at a university:

... a bewildering variety of departments and a bewildering variety of courses. And there is no official guidance, no university-wide agreement, about what he *should* study. Nor does he usually find readily available examples, either among students or professors, of a unified use of the university's resources.⁴

Nor is Bloom to be put off with halfway measures. Already he suspects that the impulse for reform he seeks to fan would result in nothing more than a touching-up of the general-education requirement. The "most administratively satisfying solution," he sneers, is to require students to sample more widely among the standard courses already being offered: "The reigning ideology here is *breadth*, as was *openness* in the age of laxity."⁵

The targets in Hirsch's *Cultural Literacy* are primary and secondary

school curricula that have come to teach skills at the expense of the kind of shared knowledge on which a flourishing culture inherently depends. Nor is it just a matter of content, but of teaching a national vocabulary in an orderly, coherent way. In part, Hirsch's popularity among academics derives from his standing as an acceptable alternative to Bloom. Hirsch, after all, focuses on the precollegiate curriculum while preserving the scholarly community's right to proceed in an orderly, consensual way to define what was essential to the national vocabulary. But it is a fundamental misreading of the message to believe that Hirsch is not serious about actually achieving a single national standard. "The question 'Who is to say what that content shall be?' must not be allowed to serve its traditional role as a debate stopper." It is not "undemocratic or intolerant," in Hirsch's words, to define what American students should know.⁶

It takes little imagination to extend either Hirsch's argument or his prescription to higher education. What he calls for, and by implication what his admirers have endorsed, is a more orderly, more sequenced, more content-specific curriculum that is also more coherent organizationally and culturally.

Coherence is precisely what the Association of American Colleges

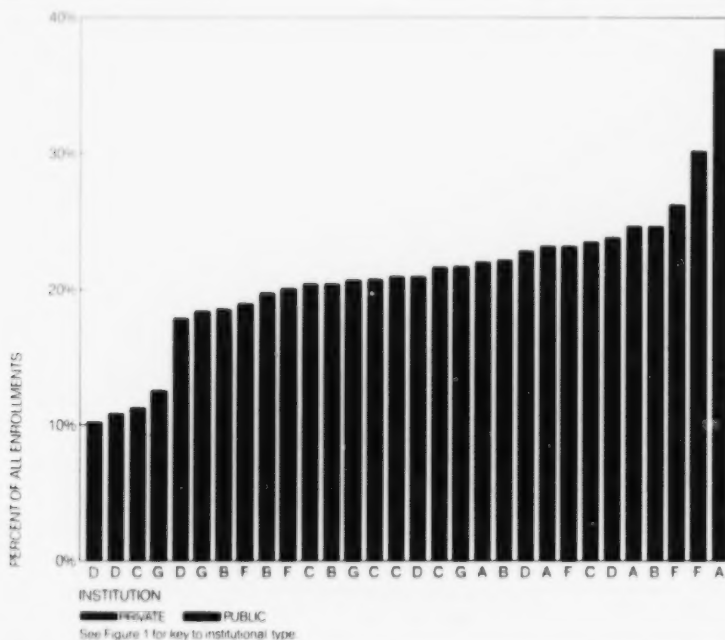
calls for in *Integrity*. That report minces no words: American colleges and universities no longer have a firm grasp of their goals and missions. This loss of focus and resolve is evident both in the educational process that provides students with smatterings of assorted knowledge more often than any systematic depth of learning, and in the quality of graduates who, once in the labor force, too often lack the basic skills or sense of

values necessary to thrive as productive citizens.

Colleges and universities, like the primary and secondary schools, have all but abandoned any sense of structure. The decline in requirements has been contagious, leading to a loss of rigor at every level. The report is openly scornful of the state of the undergraduate curriculum:

As for what passes as a college curriculum, almost anything goes. We

FIGURE 17
MATH/SCIENCE CREDIT UNITS



have reached a point at which we are more confident about the length of a college education than its content and purpose. The undergraduate major . . . everywhere dominates, but the nature and degree of that concentration varies widely and irrationally from college to college. Indeed, the major in most colleges is little more than a gathering of courses taken in one department, lacking structure and depth, as is often the case in the humanities and social sciences, or emphasizing content to the neglect of the essential style of inquiry on which the content is based, as is too frequently true in the natural and physical sciences.⁷

Those who would argue that the current critique of the undergraduate curriculum exaggerates the problem will derive little solace from our findings. To the extent that the institutions in our sample are representative of colleges and universities in general, we find the undergraduate curriculum in the liberal arts lacking in sufficient breadth of study, particularly in the natural sciences and mathematics, and lacking in substantial depth, as measured by either structured or temporally focused coursework.

The problem, of course, is that our sample of institutions is not representative. A college or university willing to participate in such a study is likely

to be concerned with issues of curricular coherence and hence likely to be attempting substantive improvements. At the institutions in our sample, there is probably more breadth and depth of study and more temporal focus than at a majority of the nation's four-year colleges and universities.

2. Undergraduate exposure to the natural sciences and mathematics is dangerously low.

We will not be the first to note the large number of students graduating without broad exposure to the natural sciences and mathematics. We have supplied an important quantification to the issue, particularly if we assume that our sample of institutions is actually biased in favor of science education. Requiring four courses in the natural sciences and mathematics does not seem to us to be particularly stringent. Yet only five institutions in our sample either required or encouraged their graduates to meet this standard. In more than half the institutions, more than one-eighth of the graduates took fewer than three courses in the natural sciences and mathematics.

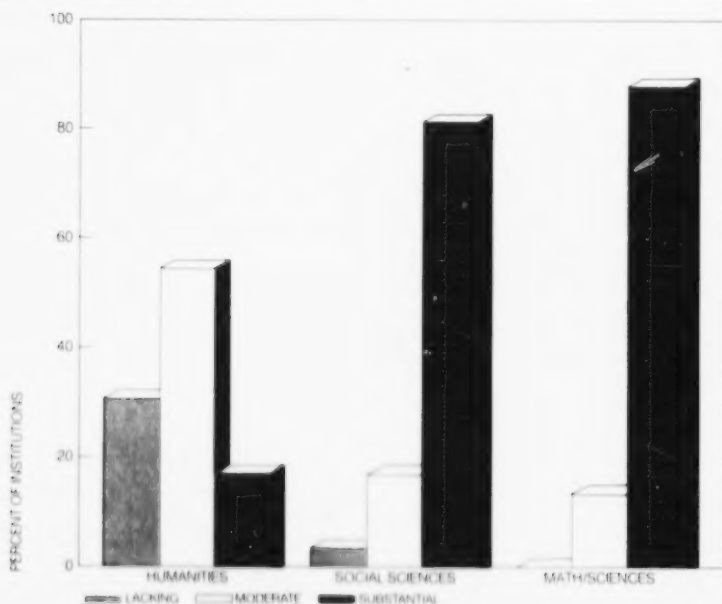
The natural sciences and mathematics also are losing out in the competition for student enrollments. Although our data are cross-sectional rather than longitudinal, there is an implied sense of erosion. At most institutions, natural sciences and math-

ematics enrollments accounted for less than 20 percent of the course or credit units earned by the graduates. At only one of our thirty institutions—a high-priced, selective research university with a strong reputation for pre-medical studies—did course units taken in the natural sciences and mathematics exceed 30 percent of all course units taken by the graduating class. (See Figure 17.)

3. The humanities in particular need to focus more attention on how, when, and why to introduce greater sequencing into their curricula.

We are aware that our definitions for curricular structure and coherence work best for the natural sciences and mathematics, where there is a clear commitment across the disciplines to sequenced learning. When, early in our analysis, we shared our

FIGURE 18
DEPTH OF STUDY BY DOMAIN
(ALTERNATE DEFINITION)



Too often, humanities courses are open to beginning and advanced students alike, without any sense that some things must be learned first

first findings with participating institutions, we received two responses. Some suggested we were wrong to use the same standard to compare coursework in the humanities with coursework in the other domains. They protested that the definition of chains of courses and the use of prerequisites to measure the structure of the humanities curriculum missed the nature as well as the purpose of instruction in these disciplines. Other respondents went further, arguing that students who take the humanities seriously compiled experience in a range of courses, rather than within a narrowly defined sequence of specific courses as in the natural sciences and engineering.

To test this explanation we constructed an alternative definition of advanced coursework to include all courses in which at least 75 percent of the students had taken three or more courses in the same field as the course. The curriculum across a particular domain was judged to provide depth if at least 25 percent of the courses met the definition for advanced work. A curriculum was judged to be lacking in depth if more than 30 percent of the courses were mixed—that is, if the courses combined beginning, intermediate, and advanced learners.⁸ Using this alternate definition, the number of institutions providing substantial depth of study in the humanities increased by just one insti-

tution, from four to five. The number of institutions judged to have provided moderate depth of study in the humanities increased from five to sixteen. On the other hand, the distance between the humanities and social sciences also increased using the new definition, further highlighting how fundamentally different course-taking patterns in the humanities are. (See Figures 7 and 18.)

Much of the fire of the Bloom and Hirsch critiques of the undergraduate curriculum is centered on the humanities, which they find too often to be desultory, inconsistent, and lacking sufficient rigor to provide a coherent understanding of the domain's precepts and principles. The relative lack of temporal focus and depth of study across the humanities is consistent with those observations. Too often, it would appear, humanities courses are open to beginning and advanced students alike, without any sense that some things must be learned first or that experience within the humanities itself makes one a more advanced learner. One explanation, we suspect, is that in market-driven undergraduate curricula, the humanities have attracted sufficient numbers of students by essentially practicing a kind of internal open admissions. The question becomes one of gauging the appropriateness of this pattern.

In style as well as philosophic perspective, there are substantial differ-

ences separating Bloom, Hirsch, and *Integrity*. Yet there is also a fundamental sameness in their concern, often mixed with anger and despair, over the fragmentation of the learning experience. There is even a shared reliance on market metaphors to portray the chaos they see rising around them. Bloom describes the humanities, in particular, as lacking both order and any sense of what should not belong, "of what its disciplines are trying to accomplish or how." Students are left not knowing what to look for or how to acquire that satisfaction that comes from seeing experience whole. "The analogies tumble uncontrollably from my pen," Bloom writes. "The humanities are like the great old Paris Flea Market where, amidst masses of junk, people with a good eye found castaway treasures that made them rich."⁹ Hirsch, borrowing freely from *The Shopping Mall High School*, uses the market metaphor to explain the how and why of cultural fragmentation: "The inevitable consequence of the shopping mall high school," with its cafeteria-style education that places few demands on students, is "a steady diminishment of commonly shared information between generations and between young people themselves."¹⁰

Integrity puts it this way:

The curriculum has given way to a marketplace philosophy: it is a supermarket where students are shop-

pers and professors are merchants of learning. Fads and fashions, the demands of popularity and success, enter where wisdom and experience should prevail. Does it make sense for a college to offer a thousand courses to a student who will only take thirty-six?

The marketplace philosophy refuses to establish common expectations and norms. . . . [T]he institutional course requirements outside the major . . . lack a rationale and cohesion or, even worse, are almost lacking altogether. Electives are being used to fatten majors and diminish breadth. It is as if no one cared, so long as the store stays open.¹¹

Our data reflect the experiences of students who entered college in the fall of 1982, substantially before many of the current reforms took place.¹² In this sense, the data reflect a kind of "collective before" against which to measure those reforms. Some already suspect that the reforms will prove largely superficial. Others argue that lasting changes are beginning to take place. Fundamentally, those reforms will fail if they do nothing more than regulate the shopper. What is required is a recognition that the product itself must be changed—that the individual parts must be designed to fit together in an education that provides genuine structure as well as coherence.

NOTES

1. *Integrity in the College Curriculum: A Report to the Academic Community* (Washington, D.C.: Association of American Colleges, 1985), 15.
2. Focus in intermediate courses was not used as a criterion because it did not provide as sharp a definition as did focus in freshman and senior courses.
3. *A Nation at Risk: The Imperative for Education Reform* (Washington, D.C.: National Commission on Excellence in Education/U.S. Department of Education, 1983), 1.
4. Bloom, Allan. *The Closing of the American Mind: How Higher Education Has Failed Democracy and Impoverished the Souls of Today's Students* (New York: Simon and Schuster, 1987), 338.
5. Bloom, 342.
6. Hirsch, E. D., Jr. *Cultural Literacy: What Every American Needs to Know* (Boston: Houghton Mifflin, 1987), 144.
7. *Integrity*, 2.
8. Intermediate courses are those courses in which at least 75 percent of the students had previously taken one or two courses in the same field. Beginning courses are those courses in which at least 75 percent of the students had previously taken no courses in the same field.
9. Bloom, 371.
10. Hirsch, 20-21.
11. *Integrity*, 2-3.
12. The findings for breadth, depth, and temporal focus do not reflect part-time, intermediate, or transfer students.

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